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TRANSPORT INTEGRATION - AN IMPOSSIBLE DREAM?

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Abstract

Transport Integration and an Integrated Transport Policy have been widely espoused for many years, yet remain an ambiguous and ill-defined concept. After featuring strongly in the 1998 Transport Policy White Paper, recently transport integration has received less emphasis. However it appears it is set for a return under the new Transport Secretary, Lord Adonis.

This paper explores the meaning of Integrated Transport. It concludes that there is no point in attempting to identify a single definition, but that there are overlapping layers of meaning, with higher levels incorporating lower, or narrower, understandings of the term Integrated Transport.

This exploration of meanings of integration is a development of initial work (Potter and Skinner 2000) and is important as the alternative meanings lead to different transport policy responses. These meanings include:

- Locational Integration: being able to easily change between transport modes (using Interchanges) - this is about services connecting in space
- Timetabling Integration: Services at an interchange connect in time.
- Ticketing Integration: Not needing to purchase a new ticket for each leg of a journey
- Information Integration: Not needing to enquire at different places for each stage of a trip - or that different independent sources are easily connected
- Service Design Integration: That the legal, administrative and governance structures permit/encouraging integration
- Travel Generation Integration: Integrating the planning of transport with the generators of travel (particularly integration with land use planning)

Furthermore, there are inherent tensions which make transport integration difficult to achieve. Only limited progress has been achieved in the UK since the 1998 White Paper, and even in Germany, with their strong transport policy structures, integration has failed (Schöller-Schwedes, 2009). This exploration of meanings will also explore the tensions involved as there is a danger of the UK chasing again a flawed concept.

1. Yes, but what do you mean by an 'Integrated Transport Strategy'?

Transport Integration and an *Integrated Transport Policy* have long been espoused, yet remain ambiguous and ill-defined concepts. After featuring strongly in both the 1998 and 2004 Transport Policy White Papers (DETR, 1998 and DfT 2004) and a variety of other transport and urban policy documents, in recent years transport integration has received less emphasis in UK transport policy making. However the notion appears set for a return under the current Transport Secretary, Lord Adonis. This paper's exploration of the meanings of integration is a development of earlier work (Potter and Skinner 2000) on this definitional issue and seeks to explore the implications it has for transport policy making.

There is a (probably apocryphal) story that in the mid 1990s, representatives of an environmental pressure group went to lobby Dr Brian Mawhinney, then the Secretary of State for Transport. He listened to them carefully with eyes closed and, when they had finished, he opened his eyes and said "Yes, but what do you mean by an 'Integrated Transport Strategy'?" They had no coherent answer, because 'Integrated Transport Strategy'

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meant a different thing to each of them. To some extent the vagueness and variability of meaning is a political advantage. It can produce apparent agreement despite really meaning quite different things to different people and organisations.

In consequence it is possibly not surprising that one of the earliest uses of the phrase "Integrated Transport Policy" was not in a government policy or a transport research document, but in the 1981 BBC Television political comedy *Yes Minister*. In an episode entitled *'The Bed of Nails',* (Lynn and Jay, 1981) an Integrated Transport Policy is proposed. The main problem is finding a sufficiently gullible minister to front such a politically thankless task with so many risks and little potential for immediate reward. Thus a buck-passing plot unfolds with, eventually, the Integrated Transport Policy being shelved in a return to the party's core approach to transport of "our policy is not to have a policy".

Figure 1: Scene from 'Yes Minister'

It is notable that our current Transport Secretary, Lord Andrew Adonis has shown an acute awareness of the *Yes Minister* conundrum of 'integrated transport'. In a speech to the Transport Times Conference in 2009 (Adonis, 2009) he refered to the: *"dreaded words 'integrated transport policy', which Sir Humphrey Appleby famously described as 'a bed of nails, a crown of thorns and a booby trap.' But then his minister, Jim Hacker, didn't seem to achieve anything much at all in his many episodes as minister or indeed Prime Minister, so I am not proposing to take any lectures from him."*

In this, and associated recent speeches, he has talked of "genuinely integrated transport", with a variety of examples, varying from:

- July 2009: "a greater provision of bicycle storage facilities at railway stations to encourage greater transport integration"
- September 2009: "integration between aviation and low carbon transport modes, particularly public transport to and from airports and high speed rail for an increasing proportion of medium distance journeys"
- November 2009: "more effective integration of public transport into the planning of local communities"

The November 2009 Independent Station Champions' Report advocated: "Major improvements are needed in bus/tram/rail integration, as well as facilities for cyclists", which Lord Adonis enthusiastically endorsed.

These quotes, as well a showing the renewed emphasis on 'transport integration', also illustrate that there are several meanings of this phrase.

These meanings include:

- **Locational Integration:** being able to easily change between transport modes - services connecting in space
- **Timetabling Integration:** Services at an interchange connect in time.
- **Ticketing Integration:** Not needing to purchase a new ticket for each leg of a journey
- **Information Integration:** Not needing to enquire at different places for each stage of a trip (or that different independent sources are connected to appear seamless to a user)
- **Service Design Integration:** That the legal, administrative and governance structures permit/encouraging integration

- **Travel Generation Integration:** Integrating the planning of transport with the generators of travel (particularly integration with land use planning)

These various meanings have an important implication. The different meanings involve addressing different elements of the transport system and consequently different public policy objectives, tools and measures. The varying definitions of 'transport integration' are actually a battleground about what is transport planning.

Perhaps it is easiest to start with the most basic meaning of integration; Lord Adonis' putting bike racks at stations - facilitating interchange

2. Locational Integration

The term 'transport integration' is frequently used simply to mean a well designed interchange. Designing effective interchanges is fundamental to public transport, but is often seemingly treated in a superficial manner. In some cases the function of interchange becomes subsidiary to the form (for example, an architecturally superb station that is really difficult for travellers to use!). In other cases the concept of interchange seems stunningly absent (with a town's bus, coach and rail stations located well apart from each other).

Both Department for Transport guidance (DfT, 2000) and work by the Commission for Integrated Transport (CfIT, 2000, Chapter 3) identifies a growing range of key physical interchange types. Good locational interchange seems a very obvious design criterion, but the fact that it does not always happen can seem puzzling. One reason for this is that transport operators and the planners of transport services can define their design boundary around their own services. For example, rail operators see their role as taking passengers between stations and bus operators between bus stops. They may not view it as part of their business to consider how passengers travel on other stages of a journey.

But more fundamentally, it can make competitive sense for some operators to provide bad interchange. For example, a bus company that competes with a metro or a local rail line may purposely avoid stopping near a metro or railway station. This occurred in Tyne and Wear when the buses were privatised in the 1980s. Previously the buses linked well into Metro stations, but the new operators chose to bypass the stations and run direct to major destinations. In Leicester, the two rival bus operators city centre stations are located well apart, and of course are distant from the rail station! Similarly, coach operators often locate away from rail stations for competition and operational reasons. Town centres have congested roads, slowing down coaches and raising costs, so a city-edge or suburban location is often more attractive. Such considerations have even led to the development of motorway 'Coachways' (Milton Keynes and Reading being prime examples), just off motorway junctions but well away from the hub of a town's bus and rail services.

The lack of consideration for locational integration may not be commercially irrational. Not only may it reflect the fact that the separate transport modes and operators have sought to develop and protect their own markets and services, but interchange trips may be a small part of their business. This is particularly so for bus, with only 3% of bus journeys involving interchange other than walk. Consequently it makes sense to run buses to a town centre (which is a core market) rather than to a rail station, unless this niche connecting market can be easily be served enroute. Diverting to serve 3% of your market could jeopardise the core 97%, so ignoring interchange can be sound commercial sense.

This helps to explain why good locational interchanges may not be provided, and that, even when there may be an interchange, operators are little concerned about them. But once the design boundary is changed to look at a whole journey (i.e. from a passenger perspective) then locational integration becomes important. This more integrative view has led to developing examples of interchange which help to grow public transport use. Effective interchange can open up new markets. Over the last 20 years, the railways in particular have realised that they need to facilitate access to their services and have developed rail/car 'Parkway Stations'. Examples include Luton Parkway, Bodmin Parkway, Birmingham International, Haddenham/Thame, Warwick, Aylesbury Parkway and East Midlands Parkway. A number of these also double as bus/coach/air and rail interchanges as well.

In some cities, suburban interchanges are starting to emerge. For example Nottingham is developing bus/metro transport hubs at district centres, hospitals, universities and major

employment sites. These facilitate city-scale hub and spoke operations, allowing passengers to avoid travelling via the congested centres. In most cases this makes commercial sense and is largely driven by managing passenger loads to shift trips away from congested peak city centre routes so as to increase income or cut operating costs.

Car hire at rail stations has proved useful for developing business travel and is becoming common (a similar practice to airports). In the Netherlands most stations have bicycle hire and in Switzerland stations also have Car Club parks.

Overall, there is an increasingly wide range of locational interchange developments that relate to a diversity of travel options and to differences in user requirements. However, progress has been slow and faltering. There does remain a tension between the immediate protection that is offered by non-integration as opposed to the market growth benefits of effective locational interchange. The benefits of the former to the bottom-line are clear and immediate, while the benefits of the latter, although potentially large, involve uncertainty and risk and involve learning how to get integration right. This is a situation that is repeated as we explore further meanings of integration.

3. Timetabling Integration

Timetabling integration is about ensuring that connecting services link up. This is most established within an individual transport system - like rail connections at key stations or air services at hub airports. The Swiss have taken timetabling integration to a very sophisticated level on their railways. This is to get national rail services to operate to an hourly arrival and departure pattern at major hub stations. Trains arrive just before the hour in order to permit passengers to interchange to other services that depart on the hour. This timetable integration design has required some serious technical design changes as services needed to be speeded up by the introduction of tilting trains and track improvement.

Timetabling integration between different operators and modes is less well established, even for services to flagship Parkway-type railway stations. Again, as noted for Locational Integration, connecting trips may form a small part of the market for a bus service and so bus operators may be reluctant to reschedule services for the convenience of those interchanging to rail or coach services. However, some bus operators have tackled the risks involved and identified market opportunities where timetable integration can be to their advantage. A well-branded example is the Helston Branch Line bus service in Cornwall which links into rail services at Redruth and even publishes combined rail/bus timetables.

Figure 2: A Cotswold Line Railbus in Chipping Norton.

A key aspect of timetabling integration is that it becomes less relevant as service frequencies increase. For example, buses and the Underground in London run so frequently that they do not need to be designed to link with specific trains at mainline stations. Integrated timetabling is therefore more important when linking between lower frequency public transport services.

In San Francisco's Bay Area, the BART Metro links into local bus services at suburban interchange stations. At many of these, the Metro service is more frequent than the buses and so careful integration of timetables is not needed. However, in the evenings and on Sundays, the frequency of the BART trains drops on some lines to every 30 minutes. At these times the buses are scheduled to depart 5 minutes after the BART train arrives. However a key aspect here is that both BART and the buses are state-owned and timetable integration is a result of a top-down policy decision.

Timetable integration can lead to the development of new transport concepts. These have included linked demand responsive feeder/distributor services. Taxis at stations are an obvious example of an integrated demand responsive service, but this has been developed by Dutch railways into their innovative shared 'Treintaxi'. The passengers pay a fixed additional fare per person per ride regardless of the distance within the defined service area, typically approximately 8km around the station. Taxis wait for up to ten minutes for other passengers to join (up to a maximum of four), and the driver sorts out the best route to drop people off.

In the UK this idea has been adopted by Chiltern Trains at Bicester and Aylesbury stations and shared taxis also operate at Paddington for passengers from the Heathrow Express. Overseas, the Airport Shuttles in the USA are organised in a similar manner - whereby groups of passengers heading to a particular area link into an airport with a guarantee to connect with their flight. This system has recently been introduced in London with the dot2dot shared shuttle linking Heathrow with central London destinations (see 'Interchange DRT' in Enoch et al, 2004).

As is the case for locational integration, where operators are able to identify markets where timetable integration will benefit them (or public authorities require it), it can be effectively implemented. However where interchange trips remain low or timings clash with the schedule needed for a core non-interchange market, timetabling integration can be disregarded.

4. Ticketing Integration

Even if a bus arrives just before a train, you may miss your connection if you need to queue to buy a separate ticket. A further level of integration is where not only the services link at the same location and in time, but there is through multi-modal ticketing. This was an aspect noted in the CfIT report on integration (CfIT, 2000, Ch. 2). Again, for valid commercial reasons, operators may find it to their benefit not to integrate ticketing systems. A clearly successful commercial strategy of non-integrated ticketing are the low cost airlines.

However, particularly in urban areas, local authorities have promoted the use of multi modal ticketing systems. Such developments have a long and patchy history; at the beginning of the 20th century, one revolutionary feature of the London Underground was that you did not have to buy a new ticket when you changed lines. This seems an obvious point - but there are still major world cities you need to buy a separate ticket when changing between rail, metro, LRT and bus.

The 'Carte Orange' in Paris is a well-established integrated ticketing system. In London, a key development of the 1990s was integrated ticketing covering all bus, underground, light and heavy rail and tram services within the Greater London area. This has evolved into the electronic 'Oyster' stored value smart card which can be used on all public transport within the Greater London area. The paper ticket system is retained for visitors, tourists and occasional users. Similar multi-modal smart card systems operate in many other major cities. However, smart card systems have also been introduced limited to only a single provider's services, particularly for buses.

Other joint ticketing products are also being developed. Nottingham has investigated joint ticketing with taxis for completing late night journeys from its NET tram stations. This has already been tried at some suburban London tube stations. UK Train operators now offer an add-on bus daypass (PlusBus) for many towns and cities. A particularly innovation is that some car clubs have joined London's Oyster Card system. Indeed, the Swiss are looking to develop a national smart card system that can be used by all forms of transport in the country - a more general stored value card that, as well as paying for public transport, also pays for car hire, bike hire and car clubs.

Two approaches appear now to be emerging. One is the integration of public transport smart cards to cover more transport services. The alternative is that transport ticketing will become an add-on to ordinary debit/credit cards; indeed there is already an integrated Visa and London Oyster card. The latter now seems the most likely long-term way integrated ticketing will go. This is particularly so as integrated charging systems are now becoming necessary for developments in the private car. An important part of the 2010-12 *Joined Cities* trials for

electric vehicles 'Plugged in Places' programme, (Department for Transport, 2009) is not only to provide on-street electric vehicle changing infrastructure, but an integrated payment system. Possible approaches include integration with the Oyster card or setting up a system linked to other IT developments in financial services.

Overall ticketing integration looks like it will now be driven not by a transport policy desire, but by IT developments in financial services as this is commercially viable. Electric vehicle developments may well accelerate this trend. There is a danger of public policy not recognising this situation and continuing to seek localised integrated public transport ticketing when the potential is there for the whole payment system to be revolutionised.

5. Information Integration

The provision of integrated information is an important issue in a multi-mode, multiple operator transport system. Like timetabling, each mode of transport has tended to provide information only on its own services. Ask at a rail station if there is a bus connection to another place, and you are likely to be told 'We don't run the buses and don't know'. Many well integrated urban public transport systems fail on interchange information. Even the excellent Hong Kong Metro has no information at its stations on connecting bus services. When, as a visitor, I asked about buses and was simply told at the Metro Information Booth that 'the bus stops are that way' (although at least they were located next to the station!).

In London, at-station interchange information provides poster displays of bus services from the station, the location of bus stops and a street map of the area within about a 5 minutes walk. As part of this, the system of colour coding of routes, used extensively on metros, is used for bus routes (See Figure 3). UK Mainline rail stations are now starting to follow suit and the colour coding of bus routes and use of easily-understood diagrammatic maps is becoming widespread.

Figure 3: Example of at-station interchange information at Uxbridge Underground Station in London. This includes a local map (with takaway versions) and bus connections. The Bus station is located next to the Underground station.

However information integration is more than providing guidance at stations. A report on integration by the Commission for Integrated Transport (CfIT, 2000, Chapter 2) advocated 'the availability of comprehensive, and preferably real time, information before the journey is made, at the start of the journey and during it'. At station information is part of the 'start' and 'during the journey' information. During journey information includes aspects such as real time information at Bus Stops (e.g. a count down to when the next bus arrives), in train and bus displays of the route and stops, announcements of the next station and expected arrival time. Simple effective signposting and guidance around interchanges is also important.

Figure 4: Real time display at a Strasbourg Tram stop

Before journey multimodal information has been problematic, but is improving, largely thanks to the internet. Each mode of transport has tended to provide information on its own operations. For example, rail timetables show only trains (and sometimes only the trains of the one operator on a route). Working out a combined trip by bus, rail, metro and another bus required a series of timetables and phone calls to a lot of different operators. Integrated telephone and web-based information services are beginning to overcome this problem. Some web operators have realised there is a commercial opportunity for integrated public transport information. It is becoming available as a service for mobile phone users and integrated public transport information is even provided now as a service on Google Maps.

A logical development of integrated information, which could actually be a further integration category in its own right, has been the European Union's Citizen's Network concept (European Commission 1996). This is that public transport systems across the whole EU should adopt a common set of design semantics in the same way that the road systems across Europe are standardised for motorists. This would involve presenting information on public transport in the same way and harmonising the way public transport is used (e.g. how to get tickets and how the tickets are used).

Providing information on how to use public transport in a standard format would be very useful, but there seems to have been little progress on the EU's somewhat centralist and bureaucratic approach. However, getting cross EU agreement on ticketing products and practicalities may become subsumed in the emerging commercial markets for smart cards and internet-based information provision. As with integrated ticketing products, integrated travel information is not emerging as a result of transport planning and policy, but as a by-product of the IT revolution by IT providers who can make money out of this service.

6. Service Design Integration

Service design integration is largely about the above aspects of timetabling, ticketing and information. These three aspects are functionally very interdependent, yet in practice, for transport services they have become disjointed. This has been due to a range of factors, largely about where operators establish boundaries around their designed system and its sub-components. The key characteristic of the information technology revolution is that it facilitates and enables linkages to be made between system components. Developing such links is not a central part of the culture of transport operators, who are trying to apply IT within their unintegrated subsystems. Although this might protect their own commercial and professional territory, is against the whole ethos and thrust of IT developments. We are thus seeing other, often more powerful, players in the IT industry starting to integrate transport services - hence the key role emerging of a range of non-transport players varying from web designers in search engine companies to the major credit card providers. After decades of governments and the EU vainly seeking transport integration, it may eventually be achieved by the likes of Google and Visa!

But service design involves a further aspect of integration, which IT fails to touch. There is an important issue about whether the administrative and governance structures permit or encourage integration. This is well illustrated by the contrast between the governance of transport provision in London and elsewhere in the UK. In London the structure of transport regulation both permits and encourages service planning integration, integrated ticketing products and links into the planning system to encourage locational integration. This all has a focus through Transport for London (TfL), which contracts private operators to provide bus, rail and tube services. Outside London the deregulated, privatised structure makes such an approach very difficult. Indeed, some aspects of integration are even illegal (e.g. co-operation between private operators to provide a regular frequency bus service where their routes coincide can be challenged as an 'uncompetitive practice'). The regulatory structure is designed to facilitate competition not co-operation. Other aspects of regulation may also discourage integration; in particular the way in which income from multi-modal ticketing is distributed can result in operators refusing to participate in through ticketing schemes or operating their own competing ticketing system in order to maximise their own revenue.

Consequently, if integrated travel is desired, legal and industry structures need to be adjusted to permit and encourage all aspects of service design integration. In the UK this is a particular problem with the 1986 bus deregulation, which was designed to foster competition

between bus operators and positively discourages the development of integrated timetabling, services and ticketing products. Some progress has been achieved through the 2008 Transport Act's reforms to Bus Quality Partnerships, but institutional barriers to integration remain.

7. Travel Generation Integration

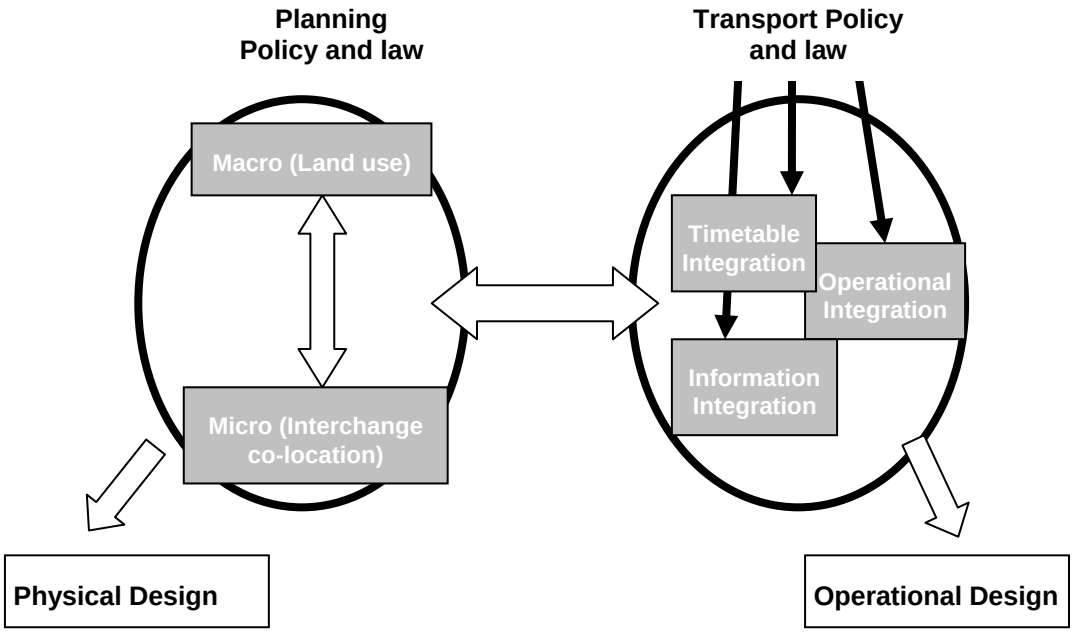
There is a final stage in public transport integration, which brings us back to the physical planning aspect considered at the beginning of this paper. Locational integration is a micro-level planning issue, but there is also a macro land use design level which is about integration the planning of transport with the generators of travel. The latter involves planning decisions regarding the location of major travel-generating land uses, particularly workplaces, shopping, schools and leisure facilities. Locating such land uses along public transport corridors allows for the development of effective interchange hubs and will also build up demand and service frequency/quality. However there is a major urban design issue in that more dispersed and sprawling settlement patterns work better for car access. Such designs characteristically have poor public transport and offer little choice to car users to travel in a more sustainable manner (Potter, 2008). Such high-level integration is vital in order for the other forms of integration to be achieved. With a major amount of new urban development planned over the next 20 years, building these settlements to designs that provide viable alternatives to car use is a crucial challenge.

Figure 5: Road and bus stop in Milton Keynes. Remote bus stops, a dispersed land use pattern and high capacity roads mean that Milton Keynes has a poor bus service and motorists have little option but to drive everywhere.

8. Meanings of Integration

Overall, this exploration of the meaning of 'integration', suggests that there are a series of ways in which different aspects of integration link together. These are represented in Fig 6. To the left are physical design aspects which range from the micro level consideration of co-location, through to the macro-level consideration of integrating land use and transport planning. All of this occurs within the context of planning policy and its associated legal and professional frameworks.

Figure 6: Meanings of Integration



The operational design aspects of integration (to the right) function within a largely separate framework of transport policy and law that, for example in the UK, includes commercial public transport operations and competition law. There are links at all levels within the physical and operational systems, but there is an important question as to whether there are sufficient links *between* these two systems, which is needed in order to achieve an fully integrated transport system. These two core systems represent different legal and planning structures and their own, largely separate, professions.

9. Achieving Transport Integration

The institutional separation of transport's physical design and operational design systems is one aspect explaining why achieving integration is difficult. However a more fundamental theme to emerge in this consideration of the meaning of 'transport integration' is that there are commercial and institutional pressures against integration. For many years, public policy has been trying to integrate transport at various levels, but at the same time public policy has also been to increase competition and privatise transport services. We need to recognise that competition is, by far, the more powerful force of the two. Integration (at whatever level and meaning) will only be accepted if it makes commercial sense. Hence in areas of service design integration, real progress has only come from the emergence of a powerful IT sector, not from decades of UK or EU green papers. Integration has come about if it makes commercial sense either in developing specific niches or if an operator is able to take a strategic, market development, approach.

A key point is that the model of competition adopted in the UK promotes a short-term, non-strategic model of competition which inherently acts against integration.

This is not only true for the UK. This conclusion is reached in the study by Schöller-Schwedes (2009) of the EU's pursuit of an integrated transport policy. It notes that the EU recently had to admit that transport developments have actually become less integrated. The political idea of cooperation has been overwhelmed by the economic dominance of competition. Schöller-Schwedes argues for a detailed analysis of the necessary political conditions for an integrated transport policy, instead of continuing to try to impose an impossible dream.

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This is probably what we need to do in the UK. Lord Adonis' desire for "genuinely integrated transport" will remain an impossible dream unless we tackle fundamental questions about how the state can structure a competitive sector so that integration (and other transport policy objectives) becomes a part of the normal commercial behaviour. As well as structural reform, the nature of transport planning needs to alter. This paper has already noted that IT developments outside the traditional professional transport arena now have a major influence. Transport planning needs to shift so that it is less about infrastructure provision and more about how the state can facilitate the benefits of integration and mitigate the risks associated with long term and strategic actions by players in our commercial system.

So, overall, this consideration of the meaning and definition of 'integrated transport' is not simply a matter of semantics. It goes to the very heart of what transport planning is about. Our confused and contradictory understanding of 'integrated transport' is because we need to resolve a confused and contradictory understanding of what transport policy is about.

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